

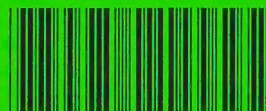
PRELIMINARY

.014

OPERATING INSTRUCTIONS

OSCILLOGRAPH
MODEL RD 2784 01

MP MASTER



MA34680

brush INSTRUMENTS

DIVISION OF

CLEVITE
CORPORATION

RA 2921-31 PEN TO REPLACES
HOT STYL

EIGHT-CHANNEL OSCILLOGRAPH

MODEL RD 2784 01

EIGHT-CHANNEL OSCILLOGRAPH

MODEL RD 2784 01

The Model RD 2784 01 Oscillograph records instantaneously, in permanent chart form, the frequency and amplitude of variables which can be represented by an electrical signal. Eight channels of information are recorded simultaneously on one chart, facilitating time correlation of the various phenomena being observed. Heat-writing styli produce rectilinear traces by presenting a lateral surface to the heat-sensitive chart paper being drawn over a sharp-edged writing bar. Two types of chart paper are available for the instrument: reproducible, from which copies can be made; and opaque, for convenient viewing.

Eight trace-density controls permit the trace of each channel to be adjusted by increasing or decreasing the voltage supplied to the styli. The recorded chart passes over a horizontal writing table and is clearly visible.

The eight-speed transmission provides chart speeds of .4, .8, 2, 4, 10, 20, 50 and 100 millimeters per second.

An event marker is supplied on the oscillograph to provide time or event coding along the left edge of the chart.

SPECIFICATIONS

Oscillograph Model RD 2784 01

OPERATING DATA

The following performance specifications apply to oscillographs using Brush chart paper:

Mounting Horizontal.

Number of Channels Eight.

Writing Method Heated stylus, rectilinear coordinates.

Chart Speeds Chart speeds are .4, .8, 2, 4, 10, 20, 50 and 100 millimeters per second.

Chart Drive Chart is driven by a synchronous motor.

Channel Width 40 mm.

Paper Drift $\pm 1/3$ millimeter.

Chart Supply Up to 250 feet.

Operating Temperature Range,

Ambient 32° F. to 135° F.

Standard Complement Eight styli, one event stylus, pen pressure gage and pen mounting tool.

Event Marker Provides an event mark on left edge of chart.

PRELIMINARY OPERATION

Set up the instrument.

1. INSTALL PAPER SUPPLY

Refer to section titled, "To Load or Change Chart Paper", page 4.

2. TURN OSCILLOGRAPH ON

3. SET CHART PAPER SPEED AT 20 MM PER SECOND

A chart speed of 20 millimeters per second, while using a minimum of chart paper, permits checking chart paper alignment. See section titled, "To Load or Change Chart Paper", page 4.

4. EXAMINE TRACE DENSITY

Stop the oscillograph and examine styli traces. If traces are not satisfactory, adjust trace density control for each channel, making the trace either lighter or darker.

However, it is recommended that the heat supplied to the styli be kept as low as possible but high enough to produce the desired writing characteristics.

5. ADJUST STYLUS PRESSURE

After adjusting the trace density controls, it may be necessary to adjust the pressure of the styli to produce the desired writing characteristics. Instructions for adjusting stylus pressure may be found in the section titled, "To Adjust Stylus Pressure", page 9.

TO LOAD OR CHANGE CHART PAPER

To load or change chart paper, proceed as follows:

1. REMOVE WRITING TABLE

Raise writing table to a vertical position, aligning flat places on hinge pins with slots into which they slide. Lift table out of oscillograph.

2. RAISE PAPER TENSION WEIGHT

3. REMOVE PAPER SUPPLY SHAFT

Lift shaft out of the oscillograph, then remove and discard used paper supply core (if any).

4. INSTALL CHART PAPER ON PAPER SUPPLY SHAFT

Slide new chart paper on the shaft so that when the shaft flange is to the left, paper will feed from the roll printed side up, toward the operator. Tamp paper core tightly against the flange.

5. INSTALL PAPER SUPPLY AND SHAFT

Press in on right end of shaft and install in oscillograph so that flange is on the left as the operator faces the instrument.

6. LOWER PAPER TENSION WEIGHT

7. INSTALL WRITING TABLE

Unroll approximately two feet of chart paper, allowing it to lie over rear of oscillograph, printed side down. Install writing table,

reversing removal procedure, step No. 1. Then lower table into operating position.

8. CENTER PAPER SUPPLY

The styli mounted on the two middle penmotors should be in alignment with their corresponding channel center lines on the chart paper.

To accomplish this, the paper supply may be adjusted to the right or left by loosening the set screws in the flange collar and moving the flange in either direction on the paper supply shaft. Check again for proper centering, then tighten set screws in the flange collar.

NOTE

Do not slide the paper supply to the right without adjusting the flange in a corresponding manner.

The paper supply must be kept tightly against the flange for proper tracking.

9. RELEASE PRESSURE ROLLER

The pressure release lever, located toward the front on the right-hand side of instrument, releases pressure against drive roller. Bringing lever upward and back releases pressure; moving lever forward and down resets pressure.

10. FEED CHART PAPER INTO PAPER CHUTE

Fold chart paper up at approximately a 45-degree angle, then feed downward between pressure and drive rollers, into the paper chute and out the front of oscillograph.

11. RESET PRESSURE ROLLER

Pull paper taut and flat across writing table, then reset pressure roller.

12. CHECK PAPER ALIGNMENT

Start oscillograph. If paper wrinkles on writing table, release pressure roller, straighten paper and reset roller.

13. START TO RECORD

Allow approximately four feet of paper to run through the instrument in order to permit paper to track properly before starting to record.

PENMOTOR

The Brush Magnetic Penmotor utilizes the familiar D'Arsonval galvanometer-type mechanism, in which the coil is used to deflect the stylus. The coil is supported by sapphire jewel bearings and is mounted in the magnetic field of an Alnico V structure. Current passing through the coil causes deflection of the coil on its axis, which in turn causes movement of the writing stylus attached to the coil.

The Brush penmotor makes use of a heavy torsion spring, as opposed to the delicate hairsprings found in the typical galvanometer. As a result, when the Brush penmotor is not energized, the coil maintains the zero position.

STYLI

The event marker assembly installed on early models of the RD 2784 01, lower than serial number 140, requires a longer stylus than the styli mounted on the penmotors. Therefore, the styli are not interchangeable and should be kept separated when removal is necessary. Later models of this instrument, from serial number 140 and up, utilize the same type styli for the penmotors and event marker, permitting the styli to be interchanged without affecting the function of either component.

STYLUS PRESSURE

Stylus tip pressure needs to be properly adjusted. Excessive pressures affect the linearity and frequency response, causing inaccuracy in the recordings. To obtain the best writing characteristics, the tip pressure should be from .5 to .75 gram.

To change or adjust stylus pressure, refer to section titled, "To Adjust Stylus Pressure", page 9.

TO REMOVE STYLI

The styli are mounted in a spring-loaded clip on the penmotor. The pen mounting tool, provided, should be used to facilitate pen changing, in order to avoid damage to the penmotor. Styli may be removed from the penholders as follows:

1. Turn oscillograph power switch off, then remove screws and lock washers which secure stylus leads to stylus terminals.
2. Spread sides of the penholder with the tips of the pen mounting tool supplied, then slide the stylus from the penholder.
3. Replace styli by reversing the above.

TO INSTALL STYLI

1. Grasp the shank of the stylus between the thumb and forefinger, with the tab pointing upward. Position the yoke of the stylus over the penholder, with the tongue of the stylus behind the penholder.
2. Align the tongue of the stylus with the grooved sides of the penholder and spread the sides of the penholder slightly with the tips of the pen mounting tool. Slide the tongue of the stylus forward as far as possible into the grooved sides of the penholder and remove the pen mounting tool.
3. Twist the two leads of the stylus into a loose spiral and connect the leads to the stylus terminals. Lugs on the two leads, as well as the stylus terminals and screws, are of different sizes to facilitate connection of leads to stylus terminals.

TO ADJUST STYLUS PRESSURE

Pressure of the writing styli may be changed or adjusted in the following manner:

1. If stylus pressure is greater than .75 gram, lift the stylus tip a few times until pressure measures between .5 and .75 gram. This may be done without removing stylus from the penholder.
2. If pressure is less than .5 gram, remove stylus from the penholder. To remove stylus, refer to section titled, "To Remove Styli", page 8. Hold the stylus tongue between two fingers of one hand and take the yoke between two fingers of the other hand, then gently bend the yoke downward. This changes the relationship of the yoke and tongue planes, causing the stylus to apply greater pressure to the chart paper.
3. Install stylus on its penholder and measure again. Repeat step 1 or 2, if necessary.

OPERATING SUPPLIES

BRUSH INSTRUMENTS
PART NO.

DESCRIPTION

Chart Paper -- 8-channel, heat-sensitive, 250 feet long, opaque	RA 2984 30
Chart Paper -- 8-channel, heat-sensitive, 250 feet long, reproducible	RA 2984 35
Heat-Writing Stylus	RA 2824 31
*Event Marker Stylus	RA 2824 30
Gram Gage	227418-910
Pen Mounting Tool	126717

* Used in model serial only.

ACCESSORIES

The accessories listed below are provided as optional equipment.

Slow-Speed Motor Drive -- Model RA 2102 50

The slow-speed motor provides eight additional chart speeds of .4, .8, 2, 4, 10, 20, 50 and 100 centimeters per hour, as well as the standard speeds of .4, .8, 2, 4, 10, 20, 50 and 100 millimeters per second. It is a synchronous motor, mounted on the motor mount bars inside the oscillograph, and operates through the standard motor by means of an overrunning spring-type clutch. The accessory is especially suitable for applications that require recordings to be made over a long period of time.

Event Marker, Right -- Model RA 2103 62

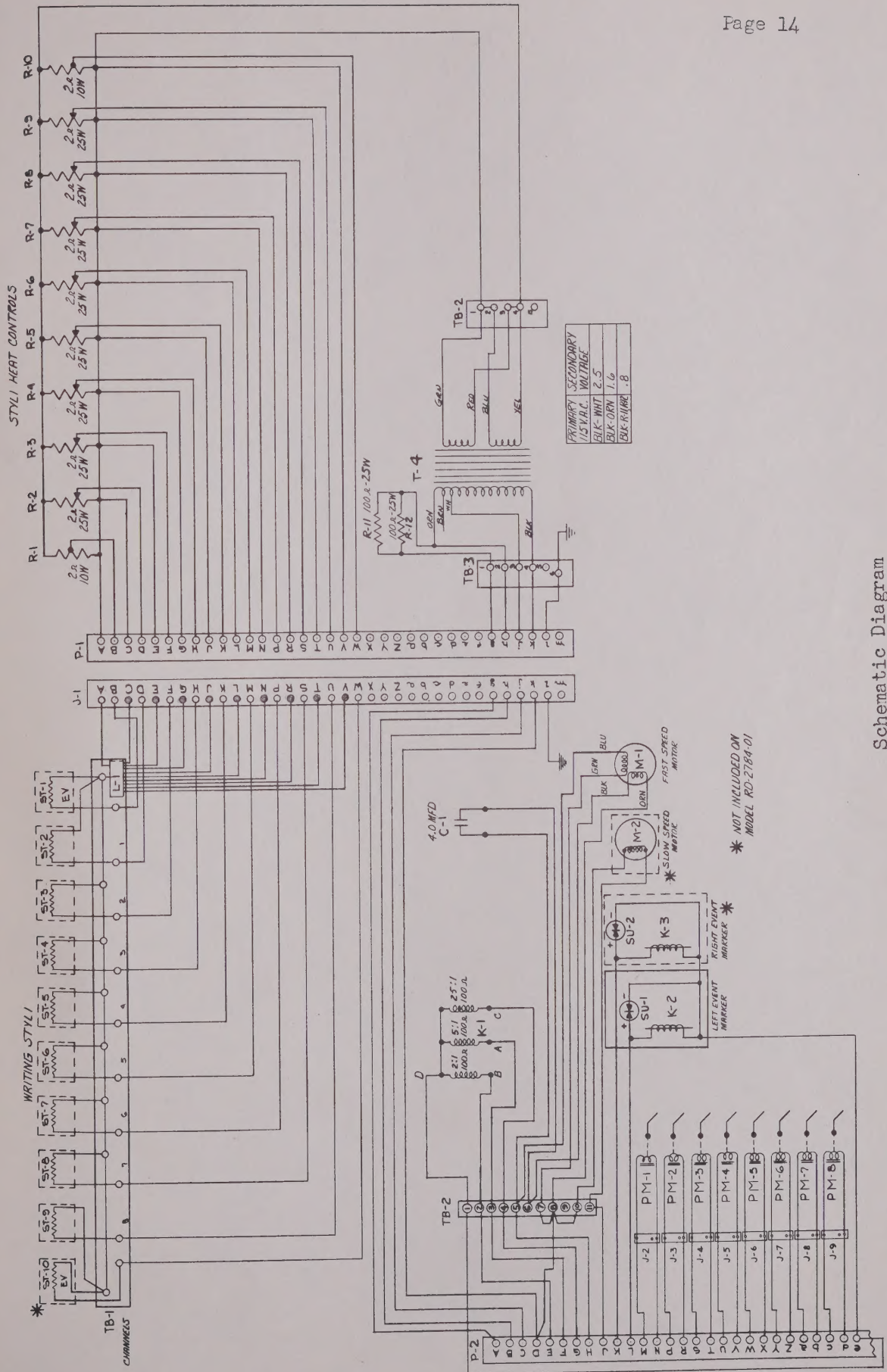
A right event marker may be installed to provide an event mark or a time pulse on the right edge of the chart paper.

The necessary wiring for the Slow-Speed Drive and the Right Event Marker is included as a part of the basic Oscillograph.

SCHEMATIC PARTS LIST
MODEL RD 2784 01

REFERENCE DESIGNATION	TITLE	QUANTITY PER UNIT	BRUSH PART NO.
C-1	Capacitor	1	20-120142-05
J-1	Connector, AN-3101A-28-15S	1	127502
J-2	Connector	1	126001-1
J-3	Connector	1	126001-1
J-4	Connector	1	126001-1
J-5	Connector	1	126001-1
J-6	Connector	1	126001-1
J-7	Connector	1	126001-1
J-8	Connector	1	126001-1
K-1	Transmission	1	216972-501
K-2	Event Marker, Left	1	227130-910
K-3	Not included on Model RD 2784 01		
L-1	Terminal, Lug	1	3-127639-2
M-1	Motor	1	317713-2
M-2	Not included on Model RD 2784 01		
P-1	Connector, AN-3106A-28-15P	1	120409
P-2	Connector, AN-3106A-28-15P	1	120409
PM-1	Penmotor	1	427034-910
PM-2	Penmotor	1	427034-910
PM-3	Penmotor	1	427034-910
PM-4	Penmotor	1	427034-910
PM-5	Penmotor	1	427034-910
PM-6	Penmotor	1	427034-910
PM-7	Penmotor	1	427034-910
PM-8	Penmotor	1	427034-910

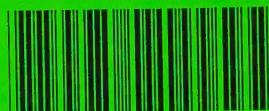
REFERENCE DESIGNATION	TITLE	QUANTITY PER UNIT	BRUSH PART NO.
R-1	Resistor	1	217143-2R0
R-2	Resistor	1	127514
R-3	Resistor	1	127514
R-4	Resistor	1	127514
R-5	Resistor	1	127514
R-6	Resistor	1	127514
R-7	Resistor	1	127514
R-8	Resistor	1	127514
R-9	Resistor	1	127514
R-10	Resistor	1	217143-2R0
R-11	Resistor	1	129114
R-12	Resistor	1	129114
ST-1	Stylus (Before Serial Number 140)	1	226827-900
ST-1	Stylus (After Serial Number 140)	1	228201-910
ST-2	Stylus	1	228201-910
ST-3	Stylus	1	228201-910
ST-4	Stylus	1	228201-910
ST-5	Stylus	1	228201-910
ST-6	Stylus	1	228201-910
ST-7	Stylus	1	228201-910
ST-8	Stylus	1	228201-910
ST-9	Stylus	1	228201-910
ST-10	Not included on Model 2784 01	1	228201-910
SU-1	Suppressor	1	114147-5
SU-2	Not included on Model RD 2784 01		
T-1	Transformer	1	126795
TB-1	Board, Terminal	1	327445-910
TB-2	Strip, Terminal	1	100184-9
TB-3	Strip, Terminal	1	100184-3
TB-4	Strip, Terminal	1	100184-3



Schematic Diagram
Model RD 2784 01

* NOT INCLUDED ON
MODEL RD-2784-01

MP MASTER



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